AMENDMENTS TO THE CLAIMS

The following Listing of Claims will replace all prior versions and listings of claims in this application.

LISTING OF CLAIMS

1.   (Currently amended) A medical viewing system for displaying a sequence of medical images that represents moving and/or positioning a guide-wire in a blood vessel, which guide-wire has a guide-wire tip that is contrasted with respect to the guide-wire, this system comprising acquisition means that acquires an original sequence of noisy images called live sequence and processing means for processing said live sequence of images in real time, the processing means comprising:

first means for automatically detecting the guide-wire tip, yielding a skeleton of the guide-wire tip comprising a series of pixels along the centerline of the tip, and field of motion vectors based on said skeleton;

second means for automatically registering the guide-wire tip with respect to a reference based on the field of motion vectors and for enhancing the images of the guide-wire and the vessel walls while blurring the background in the registered images comprising ridge enhancement means and temporal integration means for averaging pixel intensity over several images for enhancing line-like structures and blurring the background; [[and:]]

means for automatically delivering diluted contrast agent into the blood vessel over a period of a few minutes; and

display means for displaying a live sequence of processed images.

2.   (Previously presented) The system of claim 1, wherein the first means for automatically detecting the guide-wire tip are comprising means for spatially extending the skeleton, means for matching the current skeleton to a skeleton of reference, means for estimating the matching motion and means for extrapolating the matching motion to a full region of interest (ROI).

3.   (Previously presented) The system of claim 1, the processing means further comprising selecting means for selecting a Region Of Interest in the sequence of images comprising the guide-wire tip, and processing the data in said Region Of Interest.

4.   (Previously presented) The system of claim 1, further comprising control means for a user to activate, to control the duration or to stop the processing means applied to the sequence of images in connection to a selected instant of the sequence, comprising starting means and stopping means for the user to activate or stop, at said selected instant, the processing means applied to the sequence of images for improving the visibility of the selected Region Of Interest.

5.   (Cancelled)

6.   (Previously presented) The system of claim 1 the second means further comprising zooming means for zooming on the Region Of Interest.

7.   (Previously presented) The system of claim 1, the display means further comprising registering means for further registering a live sequence of processed images with respect to a sequence of corresponding images called peri-interventional, in order to form a new live sequence ($R'(t)$) on which the features of the peri-interventional images are superimposed.

8.   (Previously presented) The system of claim 1, the display means further comprising registering means for further registering a live sequence of processed images with respect to a sequence of corresponding images called peri-interventional images, in order to form a new sequence of peri-interventional images ($J'0-J'n$) on which the features of the live images are superimposed.

9.   (Previously presented) The system of claim 1, wherein the peri-interventional images are first registered in a referential formed by two patient's characteristics and the live processed images are further registered with respect to said first registered peri-interventional images.

10.   (Previously presented) The system of claim 9, wherein the patient's characteristics are a breathing characteristic and a heart pulse characteristic.

11-13. (Cancelled)

14.   (Previously presented) A medical examination imaging apparatus having means for acquiring a sequence of medical images and having a viewing system according to claim 1 for processing and for displaying said sequence of images.

15.   (Currently amended) A computer executable image processing method for displaying in a medical viewing system a sequence of medical images that represents moving and/or positioning a guide-wire in a blood vessel, the method comprising

acquiring an original sequence of noisy images called live sequence;

processing the live sequence of images in real time, the processing comprising:

detecting automatically the guide-wire tip, thereby yielding a skeleton of the guide-wire tip comprising a series of pixels along the centerline of the tip and field of motion vectors based on said skeleton;

starting an automatic device to deliver diluted contrast agent into the blood vessel over a period of a few minutes;

registering automatically the guide-wire tip with respect to a reference based on the field of motion vectors;

enhancing the images of the guide-wire and the vessel walls while blurring the background in the registered images comprising:

enhancing the ridge corresponding to the guide-wire tip; and

integrating temporally by averaging pixel intensity over several images, thereby enhancing line-like structures and blurring the background; and

displaying the processed live sequence.

16.   (Currently amended) A computer readable storage medium comprising instructions for carrying out a computer executable image processing method for displaying in a medical viewing system a sequence of medical images that represents moving and/or positioning a

guide-wire in a blood vessel, the method comprising

acquiring an original sequence of noisy images called live sequence;

processing the live sequence of images in real time, the processing comprising:

detecting automatically the guide-wire tip, thereby yielding a skeleton of the guide-wire tip comprising a series of pixels along the centerline of the tip and field of motion vectors based on said skeleton;

starting an automatic device to deliver diluted contrast agent into the blood vessel over a period of a few minutes;

registering automatically the guide-wire tip with respect to a reference based on the field of motion vectors;

enhancing the images of the guide-wire and the vessel walls while blurring the background in the registered images comprising:

enhancing the ridge corresponding to the guide-wire tip; and

integrating temporally by averaging pixel intensity over several images, thereby enhancing line-like structures and blurring the background; and

displaying the processed live sequence.

17.   (New) A method for positioning a guide-wire in a blood vessel, which guide-wire has a guide-wire tip that is contrasted with respect to the guide-wire, the method comprising:

operating a medical viewing system to acquire an original sequence of noisy images called live sequence;

processing the live sequence of images in real time, the processing comprising:

detecting the guide-wire tip, yielding a skeleton of the guide-wire tip comprising a series of pixels along the centerline of the tip, and field of motion vectors based on the skeleton;

delivering diluted contrast agent into the blood vessel over a period of a few minutes;

registering the guide-wire tip with respect to a reference based on the field of motion vectors; and

integrating temporally by averaging pixel intensity over several images to enhance the images of the guide-wire and the vessel walls while blurring the background in

the registered images; and

     displaying a live sequence of processed images.